CLAIMS

1. A non-volatile memory comprising:

an insulating substrate having a first electrode extending through the substrate from the front surface to the rear surface thereof;

a second electrode formed on one side of the insulating substrate; and

a recording layer that is clamped between the first electrode and the second electrode and whose resistance value varies when an electric pulse is applied across the first electrode and the second electrode;

the insulating substrate having a layered structure composed of an organic dielectric thin film and an inorganic dielectric layer that is thinner than the organic dielectric thin film, with the recording layer being formed on the side on which the inorganic dielectric layer is formed.

2. A non-volatile memory according to Claim 1, wherein the first electrode is filled in a fine pore formed in the insulating substrate, and a heat-resistant protective film that is made of an inorganic dielectric is formed on at least one portion of the inner wall surface of the pore.

3. A non-volatile memory according to Claim 2, wherein the heat-resistant protective film is continuously connected to the inorganic dielectric layer.

4. A non-volatile memory according to Claim 1, wherein the thickness of the inorganic dielectric layer is not less than 2 nm but not more than 50 nm.

5. A non-volatile memory according to Claim 1, wherein the organic dielectric thin film is made of polycarbonate and the inorganic dielectric layer is made of silicon oxide.

6. A non-volatile memory according to claim 1, wherein the recording layer comprises a phase-change material having at least two stable states with different resistance values and the capability of being reversibly switched between the states.

7. A non-volatile memory according to Claim 6, wherein the phase-change material includes a chalcogenide based material.

8. A non-volatile memory according to Claim

2, wherein the aspect ratio of the pore is not less than 1 but less than 10.

9. A non-volatile memory according to Claim 8, wherein the heat-resistant protective film is formed on the entire inner wall surface of the pore with a uniform thickness.

10. A non-volatile memory according to Claim 2, wherein the aspect ratio of the pore is not less than 10 but not more than 100.

11. The non-volatile memory according to Claim 10, wherein the thickness of the heat-resistant protective film becomes less in the direction from the second electrode toward the first electrode inside the pore.

12. A method for fabricating a non-volatile memory that comprises an insulating substrate having a first electrode extending through the substrate from the front surface to the rear surface thereof; a second electrode that is formed on one side of the insulating substrate; and a recording layer that is clamped between the first electrode and the second electrode and whose

resistance value varies when an electric pulse is applied across the first electrode and the second electrode; wherein the insulating substrate has a layered structure composed of an organic dielectric thin film and an inorganic dielectric layer that is thinner than the organic dielectric thin film; with the recording layer being formed on the side on which the inorganic dielectric layer is formed, and comprising the steps of:

forming the inorganic dielectric layer by depositing inorganic dielectric on one surface of the organic dielectric thin film in which a fine pore has been formed;

covering one end of the pore with the recording layer by depositing the recording layer and the second electrode on the surface of the inorganic dielectric layer in this order; and

forming the first electrode in the pore.

13. A method for fabricating a non-volatile memory according to Claim 12, wherein the step of forming the inorganic dielectric layer comprises the step of:

forming a heat-resistant protective film that is made of an inorganic dielectric on at least one portion of the inner wall surface of the pore.

14. A method for fabricating a non-volatile memory according to Claim 13, wherein the aspect ratio of the pore in the organic dielectric thin film is not less than 1 but less than 10.

15. A method for fabricating a non-volatile memory according to Claim 13, wherein the aspect ratio of the pore in the organic dielectric thin film is not less than 10 but not more than 100.

16. A method for fabricating a non-volatile memory according to Claim 12, wherein the step of forming the inorganic dielectric layer comprises the step of:

mounting the organic dielectric thin film on the surface of a susceptor with a spacer therebetween, and depositing an inorganic dielectric thereon.

17. A method for fabricating a non-volatile memory according to Claim 12, wherein the step of forming the first electrode in the pore comprises the steps of:

dipping the organic dielectric thin film having fine pores formed therein into a plating solution that contains metal ions used for forming the first electrode and has an insoluble conductive plate therein; and

applying current across the second electrode and

the insoluble conductive plate.